

CLAIMS

What is claimed is:

1. An exhaust emission control method comprising:

passing exhaust through a particulate filter from an upstream side thereof to a downstream side thereof to trap exhaust particulate in said particulate filter;

5 after passage through said particulate filter, passing said exhaust along a catalyst downstream of said particulate filter;

regenerating said particulate filter by combusting said trapped particulate, and producing a combustion product from said combustion of said trapped particulate;

10 using said combustion product to assist regeneration of said downstream catalyst.

2. The exhaust emission control method according to claim 1 comprising providing said downstream catalyst in sufficiently close proximity to said particulate filter to carry out a thermodynamically favorable reaction with said combustion product.

3. The exhaust emission control method according to claim 2 comprising passing said exhaust axially along an axial flow path comprising a flow channel having a wall-flow channel providing said particulate filter and having a flow-through channel axially aligned with said wall-flow channel in said flow
5 channel and providing said downstream catalyst.

4. The exhaust emission control method according to claim 3 comprising providing said downstream catalyst in sufficiently close proximity to said particulate filter by axially overlapping sections of said wall-flow channel and said flow-through channel.

5. The exhaust emission control method according to claim 1 wherein said exhaust is diesel engine exhaust, and said particulate filter is a diesel particulate filter trapping diesel exhaust particulate, including soot.

6. The exhaust emission control method according to claim 5 wherein said downstream catalyst is an NO_x adsorber.

7. The exhaust emission control method according to claim 6 wherein said NO_x adsorber comprises an NO_x storage element and an NO_x catalyst.

8. The exhaust emission control method according to claim 7 wherein said NO_x storage element is selected from the group selected consisting of alkali and alkaline earth compounds.

9. The exhaust emission control method according to claim 8 wherein said compound is selected from the group consisting of oxide, carbonate and nitrate.

10. The exhaust emission control method according to claim 9 wherein said NO_x storage element is selected from the group consisting of Ba, Li, Na, K and Ca.

11. The exhaust emission control method according to claim 7 wherein said NO_x catalyst is a precious metal catalyst.

12. The exhaust emission control method according to claim 6 wherein said combustion product is CO, and comprising providing said downstream NO_x adsorber in sufficiently close proximity to said diesel particulate filter to carry

out said thermodynamically favorable reaction with said CO, and regenerating said
5 downstream NO_x adsorber with said CO derived from said diesel particulate filter in
said sufficiently close proximity thereto.

13. The exhaust emission control method according to claim 12
wherein said reaction includes $\text{NO} + \text{CO} \rightarrow 1/2\text{N}_2 + \text{CO}_2$.

14. The exhaust emission control method according to claim 13
comprising oxidizing soot in said diesel particulate filter, providing said downstream
NO_x adsorber in sufficiently close proximity to said diesel particulate filter to further
carry out the reaction according to said $\text{NO} + \text{CO} \rightarrow 1/2\text{N}_2 + \text{CO}_2$.

15. The exhaust emission control method according to claim 14
comprising also generating CO₂ from said CO according to $\text{O}_2 + \text{CO} \rightarrow \text{CO}_2$.

16. A method of reducing wasteful loss of CO to oxidation in an
exhaust emission control regeneration method for diesel engine exhaust wherein said
exhaust is passed through a diesel particulate filter from an upstream side thereof to a
downstream side thereof to trap diesel exhaust particulate, including soot, in said
5 diesel particulate filter, and wherein said diesel particulate filter is regenerated by
combusting said soot to produce CO, said method comprising providing an NO_x
adsorber downstream of said diesel particulate filter, and enhancing the chances of
said CO helping regeneration of said downstream NO_x adsorber by locating said
downstream NO_x adsorber in sufficiently close proximity to said diesel particulate
10 filter.

17. The method according to claim 16 comprising passing said
exhaust axially along an axial flow path comprising a flow channel having a wall-
flow channel providing said diesel particulate filter and having a flow-through

channel providing said downstream NO_x adsorber, and comprising enhancing said
5 chances by axially aligning said flow-through channel and said wall-flow channel
along said axial flow path.

18. The method according to claim 17 comprising concomitantly
providing both said sufficiently close proximity and said axial alignment by axially
overlapping sections of said wall-flow channel and flow-through channel.

19. An exhaust emission control regeneration method for diesel
engine exhaust, said method comprising regenerating a diesel particulate filter having
trapped diesel exhaust particulate, including soot, by combusting said trapped
particulate and producing a combustion product from said combustion of said trapped
5 particulate, and using said combustion product to regenerate a catalyst downstream of
said diesel particulate filter.

20. The exhaust emission control regeneration method according to
claim 19 wherein said combustion product is CO, and said catalyst is an NO_x
adsorber downstream of said diesel particulate filter, and comprising regenerating
said downstream NO_x adsorber with said CO.

21. The exhaust emission control regeneration method according to
claim 20 wherein said downstream NO_x adsorber is in sufficiently close proximity to
said diesel particulate filter to carry out a thermodynamically favorable reaction with
said CO.

22. An exhaust emission control method for a diesel engine exhaust
system having a diesel particulate filter trapping diesel particulate, including soot, and
an NO_x storage element downstream of said diesel particulate filter and storing NO_x,
said method comprising regenerating said diesel particulate filter by combusting said

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5 soot to produce CO, and reacting said CO with said stored NO_x to release the latter.

23. An exhaust emission control method for a diesel engine exhaust system having a diesel particulate filter trapping diesel particulate, including soot, and an NO_x adsorber downstream of said diesel particulate filter, said method comprising regenerating said diesel particulate filter by combusting said soot to produce CO,
5 oxidizing said CO to generate heat, and using said heat to regenerate said downstream NO_x adsorber.

24. The exhaust emission control method according to claim 23 comprising oxidizing said CO with a catalyst.

25. The exhaust emission control method according to claim 24 wherein said catalyst is a precious metal catalyst.

26. An emission control system for diesel engine exhaust comprising a diesel particulate filter passing said exhaust therethrough from an upstream end to a downstream end and trapping diesel exhaust particulate, including soot, at least one of said ends being coated with a catalyst facilitating heat generation
5 and soot combustion to regenerate said diesel particulate filter.

27. The emission control system according to claim 26 wherein said catalyst is selected to facilitate oxidation and combustion of said soot.

28. The emission control system according to claim 27 wherein said catalyst is a precious metal catalyst.

29. The emission control system according to claim 26 wherein each of said upstream and downstream ends is coated with a catalyst facilitating heat

generation and soot combustion to regenerate said diesel particulate filter at each of said ends.

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